ENERGY STRATEGY FOR YUKON

Yukon
Government

Energy Strategy for Yukon

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Minister's Message

As Minister of Energy, Mines and Resources, I am pleased to release the *Energy Strategy for Yukon*. With this release, the government is following through on its commitment to develop a strategy to address Yukon's energy needs, for now and for the future.

The Energy Strategy is an important guide for how we produce, conserve and use energy in Yukon. It provides guidance to energy programs, to economic development in the energy sector and to energy conservation and efficiency.

We use energy in almost every aspect of our lives, and because energy is so vital, it is important for Yukon to manage our energy resources in a planned and careful manner.

A lot of hard work has been done over the last year by many Yukoners to put together this Strategy. Energy sector research, a public workshop and an extensive consultation process all contributed to a final Strategy that is designed for Yukon, by Yukoners. The consultation process is described in Appendix I.

The Strategy focuses on four priorities for energy in Yukon:

- conserving energy and using it more efficiently;
- increasing the supply and use of renewable energy;
- meeting our current and future electricity needs; and
- managing responsible oil and gas development.

In today's age of high energy costs, it is important that the government takes a strong, proactive approach to addressing these issues. Many energy efficiency and conservation projects will continue to be delivered through the Energy Solutions Centre and other government departments in order to help Yukoners manage their energy costs and reduce their impact on the environment.

It is important that we address the energy issues that matter most to Yukon citizens. The priorities in this Strategy were developed after engaging with Yukoners and it is important that future initiatives will also be open and inclusive.

We are all building the picture for energy in Yukon. The *Energy Strategy for Yukon* provides tools that will help us to maintain our environment, our economy and a high quality of life in Yukon in the future.

Sincerely,

Brad Cathers
Minister of Energy, Mines and Resources
Government of Yukon

Summary

The *Energy Strategy for Yukon* identifies energy priorities for the Yukon government. It proposes a vision for the energy sector and principles to guide Yukon government decisions. Goals, strategies and actions for efficiency and conservation, renewable energy, electricity, oil and gas and energy choices are identified. The Strategy will provide direction for developing, managing and using energy over the next ten years.

This Strategy focuses on the Yukon government's roles and responsibilities for developing and managing energy resources. The Yukon government's energy policies and programs will also play a role in guiding other government, industry, business and individual decisions about energy. The Strategy is intended to complement and be coordinated with the government's Climate Change Strategy and Action Plan.

Vision and Principles

The Yukon government's vision is for a sustainable and secure energy sector that is environmentally, economically and socially responsible; developing and using energy resources to meet Yukon's energy needs and generate benefits for Yukon people, both now and for generations to come.

These principles will guide the government's decisions.

- Sustainability: building an environmentally, economically and socially sustainable energy sector.
- Energy security: providing a secure and reliable supply of energy for Yukon.
- Self-sufficiency: responsibly developing Yukon's energy resources to meet energy needs.
- Optimize benefits: benefiting from energy development, conservation and use.
- Climate change coordination: coordinating climate change and energy policies.
- Leadership: the Yukon government will be a leader.
- Partnerships: working in partnership to develop and manage energy resources.

Energy Priorities

This Strategy describes the government's priorities to improve energy efficiency and conservation, produce more renewable energy, meet electricity needs, responsibly develop oil and gas and make good energy choices.

Efficiency and Conservation

Energy efficiency and conservation will be a priority to reduce energy consumption, energy costs and emissions.

Priorities for efficiency and conservation:

- Increase energy efficiency in Yukon by 20% by 2020.
- Reduce energy consumption in Yukon buildings.
- Reduce energy consumption for transportation in Yukon.
- Promote the use of energy efficient products by providing incentives for products that meet energy performance standards.
- Improve energy efficiency for Yukon government operations.

Renewable Energy

Energy production from renewable sources will be increased to reduce fossil fuel use and greenhouse gas emissions.

Priorities for renewable energy:

- Increase renewable energy supply in Yukon by 20% by 2020.
- Develop a policy framework for geothermal energy.
- Support and demonstrate renewable energy projects in communities off the electrical grid to reduce diesel use.
- Conduct pilot studies to assess the feasibility of renewable energy initiatives.
- Promote renewable energy sources for heating and transportation.

Oil and Gas

Oil and gas resources will be developed responsibly for local use in Yukon and for export.

Priorities for oil and gas:

- Support strategic opportunities to replace imported diesel fuel with Yukon's oil and gas resources.
- Develop a competitive and comprehensive oil and gas regulatory regime which will emphasize performance-based compliance.
- Prepare for northern pipeline development such as the Alaska Highway Pipeline.
- Promote private sector investment in the development of Yukon's oil and gas resources.
- Finalize and implement an agreement with the federal government for sharing management and revenues for offshore oil and gas.

Electricity

Electricity supply will be increased and demand will be managed to meet current and future electricity needs.

Priorities for electricity:

- Support strategic investments in infrastructure to increase the supply of electricity from renewable sources.
- Assess the feasibility of expanding the Yukon transmission system to connect to other communities, industrial projects or jurisdictions.
- Update and develop a policy framework for electricity that emphasizes efficiency, conservation and renewable energy.
- Develop and implement demand management programs and incentives to promote energy efficiency and conservation.
- Support research and development of technologies and policies to optimize the use of hydroelectricity.
- Consider appropriate roles, responsibilities, and corporate structure for Yukon Development Corporation and Yukon Energy Corporation to ensure effective management and operation, and optimize the efficiency and reliability of electricity generation and distribution.

Energy Choices

The *Energy Strategy for Yukon* will set long term direction and define short term priorities for the Yukon government.

Priorities for making energy choices:

- Assess new and existing energy sources that could be developed in Yukon.
- Hold public consultation on a policy framework for coal bed methane, coal and nuclear power before permitting any development.
- Monitor implementation of the Energy Strategy and report regularly on progress. The first progress report will be released by the end of 2010.

Vision and Principles

The Energy Strategy puts Yukon on a path towards the vision for a sustainable and secure energy future. This vision is about meeting the energy needs of Yukon people, communities and economy. It is also about being environmentally responsible in the development and use of energy resources.

This Strategy establishes a framework for setting priorities and guiding decisions about producing and using energy. The framework consists of our vision, principles, goals, strategies and priority actions.

In this Strategy, the Yukon government looks ahead to the future and creates a long term vision for the energy sector. The short term actions will move towards the long term energy vision.

Taking a strategic approach to developing energy policies and programs will make sure Yukon is in the best possible position to respond to future energy challenges and take advantage of opportunities along the way.

Vision

Yukon will have a sustainable and secure energy sector that is environmentally, economically and socially responsible; developing and using energy resources to meet Yukon's energy needs and generate benefits for Yukon people, both now and for generations to come.

The Yukon government will demonstrate its commitment to this vision by adopting a set of principles to guide decisions about energy. These principles will be considered in a systematic way to ensure future energy decisions support the vision.

Principles

Sustainability: developing an energy sector that is environmentally, economically and socially sustainable for present and future generations.

Energy security: ensuring a secure and reliable supply of energy at a reasonable cost and reducing dependence on non-renewable energy sources.

Self-sufficiency: promoting the environmentally, economically and socially responsible development and use of Yukon's energy resources.

Optimize benefits: optimizing socio-economic and environmental benefits and opportunities for Yukon from energy development, conservation and use.

Climate change coordination: coordinating climate change and energy policies and identifying opportunities to reduce greenhouse gas emissions.

Leadership: demonstrating Yukon government leadership in responsible energy management, including research and innovation, infrastructure development, efficiency and conservation.

Partnerships: engaging individuals, private sector, First Nations, municipalities, the federal government and non-government organizations in developing and managing energy resources.

Efficiency and Conservation

Energy efficiency and conservation supports the vision for an environmentally, economically and socially responsible energy sector. Efficiency and conservation are key components of an energy sector that is sustainable and secure.

By using energy more efficiently and conserving it, fewer resources will be required to meet energy needs. Efficiency is about using resources more effectively to meet energy needs. Conservation reduces the need for energy.

Efficiency and conservation will bring tremendous benefits for Yukon. Reduced energy use will provide new capacity to meet the growing demand. Using less energy can result in lower energy costs and fewer greenhouse gas emissions. Energy efficiency initiatives often create positive economic benefits.

The starting point for the Energy Strategy is efficiency and conservation. These are broad themes that apply to all sources and uses of energy. They will also apply to specific sectors such as electricity and oil and gas.

Goal

Energy efficiency and conservation will be a priority to reduce energy consumption, energy costs and emissions.

Strategies

- Developing policies that will support energy efficiency and conservation.
- Delivering programs to support and demonstrate energy efficiency initiatives that have the potential to reduce greenhouse gas emissions and save Yukoners money.
- Incorporating long-term energy costs and environmental benefits in capital investment decisions.
- Working with other jurisdictions on enhancing the Model Energy Codes for Buildings and for Houses, as well as adding an energy efficiency objective to the National Building Code.
- Supporting local production such as agriculture to reduce reliance on the transport of goods.
- Encouraging the planning and development of energy efficient communities.
- Partnering with First Nations and municipalities to improve energy efficiency and conservation in Yukon communities.
- Partnering with the federal government and the private sector to make industry more energy efficient.

Government Taking the Lead

Governments, other organizations and individuals are engaged in efficiency and conservation throughout the territory. Everybody needs to work together to make real progress.

Many of the Yukon government's efficiency and conservation initiatives for Yukoners have been led by the Energy Solutions Centre and the Yukon Housing Corporation. The Department of Highways and Public Works has been leading efficiency and conservation for government operations.

Efficiency and conservation initiatives have grown in response to rising energy costs and mounting concern about environmental issues such as air pollution and climate change. The Yukon government's response to these issues is captured in this Energy Strategy and in the government's Climate Change Strategy and Action Plan.

Governments have an important role in efficiency and conservation. Governments can demonstrate leadership, provide incentives and help to educate people about energy efficiency and conservation.

Recognizing its role and responsibility to improve energy efficiency, the Yukon government joined other territories and provinces at a July 2008 Council of the Federation meeting in committing to achieving a 20% increase in energy efficiency by the year 2020.

The government's new energy efficiency target is a top priority for efficiency and conservation. Priority actions focus on buildings, transportation, energy efficient products and Yukon government operations. These actions represent the initial priorities for achieving the efficiency target and moving forward on energy conservation.

Priority Actions

Increase energy efficiency in Yukon by 20% by 2020.

Reduce energy consumption in Yukon buildings

- Improve access to energy efficiency evaluations by providing training for energy evaluators.
- Provide incentives to building owners to carry out retrofits.
- Promote energy efficiency for new buildings.
- Pilot heat pumps and other heating technologies in Yukon homes and monitor effects on energy consumption and prices.

Reduce energy consumption for transportation in Yukon.

- Invest in agriculture infrastructure to support production of Yukon grown food.
- Undertake a study of the transportation sector to identify strategic opportunities for efficiency and conservation.
- Develop programs to encourage efficient transportation.

Promote the use of energy efficient products by providing rebates for products that meet energy performance standards.

Improve energy efficiency for Yukon government operations.

- New building construction funded by government will meet energy efficiency standards.
- Standards for the government's vehicle fleet will set targets for vehicle use and fuel consumption.
- A green procurement policy for government will consider environmental performance of goods and services.
- An environmental stewardship initiative will advance environmental and energy stewardship within Yukon schools.

Buildings and Transportation

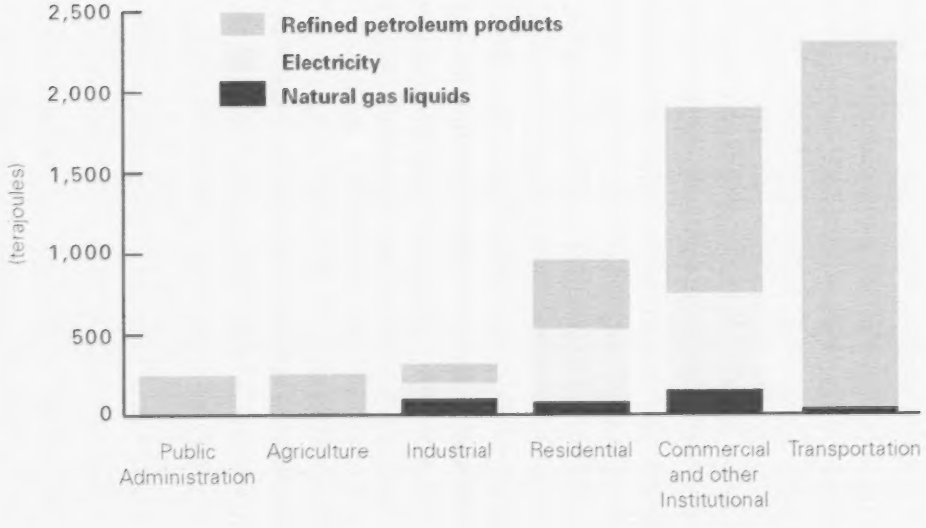
Efficiency and conservation are particularly important for Yukon. The territory has a cold climate and long distances separate it from other parts of the country. Yukoners use a lot of energy for heating and transportation.

Yukon's energy consumption by sector and energy type for 2005 is shown in **Figure 1**. The transportation sector used more energy than any other single sector. Much of the energy used in other sectors such as residential, commercial and institutional was for heating.

Efficiency and conservation efforts will have the greatest impact if governments, businesses and individuals focus on measures that will reduce energy consumption for heating and transportation. Energy savings will also be achieved through efficiency and conservation initiatives for other energy uses such as lighting.

The Yukon government's priorities for buildings focus on efficiency improvements. The Yukon Housing Corporation will continue to offer financial incentives to homeowners for energy efficiency and heating system upgrades. There are several options, including home repair programs and GreenHome incentives. For more information, go to **www.housing.yk.ca**

Figure 1 **Yukon Energy Consumption in 2005**



Source: Statistics Canada in Vector Research, 2007. *Yukon Energy Strategy Background Research, Part 3: Analysis of the Yukon Energy Sector.*

The Yukon government will work with other jurisdictions across Canada to enhance the Model National Energy Codes for Buildings and for Houses by 2011 and consider adopting the amended codes. The government will also work with other jurisdictions on revisions to the National Building Code of Canada to add energy efficiency as the fifth core objective.

The government's transportation priorities focus on agriculture investments to support local food production, a major study to identify opportunities for efficiency and conservation, and programs to encourage efficient transportation.

Longer term strategies will build on current efforts to support local goods production such as agricultural products. These strategies will also continue to encourage energy efficient communities that incorporate sustainability planning and public transit to reduce energy used for transportation.

Government Operations

The strategy for Yukon government operations has the same focus on buildings, transportation and energy efficient products as in the Yukon wide strategy.

The Yukon government's building construction will meet energy efficiency standards. Currently this is the GreenHome standard for new residential buildings and the LEED® energy efficiency standard for new institutional buildings.

New standards for fleet vehicles will be established to reduce energy consumption for government transportation. New green procurement standards will result in more energy efficient products being used for government operations.

The Department of Education is leading an environmental and energy stewardship initiative for Yukon schools. This project will assess energy use in schools, identify opportunities to reduce energy consumption and implement an energy awareness and leadership program.

Energy Efficient Products

The Yukon government launched the Good Energy program to promote energy efficient products and help Yukoners reduce their energy costs.

Good Energy provides $100 to $500 in cash rebates on a wide range of energy efficient products in three categories.

Home appliances

- Refrigerators, freezers and dish washers
- Clothes washers

Heating appliances

- Pellet and wood stoves
- Oil and propane furnaces and boilers
- Heat recovery ventilators
- Solar hot water heaters (residential)

Transportation

- Outboard boat motors

Rebates were made available for products purchased in 2008 that met energy efficiency requirements. A number of industry standards for efficiency are used. One example is Energy Star®.

This rebate program is offered by the Energy Solutions Centre. Energy efficient products are available at many Yukon retailers.

Good Energy is an expansion of the Appliance Rebate Program. In 2007, that program provided rebates for 676 appliances and 83 furnaces and boilers. Approximately 5% of Yukon households received rebates.

For more information on Good Energy, go to www.esc.gov.yk.ca

Renewable Energy

The Yukon government supports a shift towards cleaner, renewable sources of energy for the territory. Renewable energy can provide an alternative to rising fuel prices; it can be produced locally and it creates fewer greenhouse gas emissions.

There are economically and technically feasible opportunities for making greater use of Yukon's renewable resources such as hydro, wood, wind, solar and geothermal energy sources.

The economic feasibility of renewable energy will increase as fossil fuel prices rise. If future federal policies set a price for carbon emissions or a target for reducing emissions, renewable energy options will become even more attractive.

Similar to efficiency and conservation, renewable energy is another major theme for this Energy Strategy. The following goal, strategies and actions for renewable energy will also be supported by some of the initiatives for the electricity sector. One example of this is considering cleaner and renewable energy sources for all new electricity projects.

Goal

Energy production from renewable sources will be increased to reduce fossil fuel use and greenhouse gas emissions.

Strategies

- Replacing fossil fuels with cleaner, renewable energy sources where possible.
- Demonstrating leadership in developing renewable energy infrastructure.
- Investing in research and development of renewable energy technology.
- Identifying strategic opportunities to develop new renewable energy sources.
- Developing a wood based bio-energy industry in Yukon by building a local market for wood energy technologies and wood fuel products.
- Encouraging cost effective, small-scale renewable energy production to foster innovation and diversify Yukon's supply of electricity resources.
- Building partnerships with others to leverage funding and share expertise for renewable energy.

Targeting Renewable Energy

An estimated 17% of the energy used in Yukon currently comes from renewable sources . This represents 1,069 terajoules of electricity produced by hydro and wind. It likely underestimates Yukon's total renewable energy consumption as it does not account for other sources such as wood for home heating.

The Yukon government will take the lead on renewable energy by setting a target for increasing the supply of renewable energy sources. The target for this Energy Strategy is to increase energy production from renewable sources by 20% by the year 2020.

The government developed this renewable energy target to signal its commitment to cleaner, renewable sources of energy. The target calls for Yukon's supply of renewable energy to be increased to 1,283 terajoules by 2020.

This renewable energy target is aimed at growing renewable energy sources in Yukon to ensure that some of the rising demand for energy is met by renewable sources. The target does not address energy from non-renewable sources.

The strategies for meeting this target will concentrate on renewable energy sources for heating and electricity, as this is where there is the greatest opportunity for using more renewable energy sources. This could mean more hydro or wind for electricity. It could also be wood, geothermal or solar for heating or electricity.

There is a need to develop a policy framework to guide the development and use of geothermal energy for heating and electricity. The policy framework may include best practices, policies and regulations.

There are fewer opportunities for using renewable energy in the transportation sector. Any transport contributions towards this target will likely focus on new renewable fuel sources. It could also mean that Yukoners begin to use more hybrid and electric cars.

In the longer term hydrogen could become a viable form of renewable energy. This could include developing hydrogen fuel cell technology to store hydroelectricity. Or hydrogen could be used in hydrogen fuel cells for vehicles.

Priority Actions

Increase renewable energy supply in Yukon by 20% by 2020.

Develop a policy framework for geothermal energy.

Support and demonstrate renewable energy projects in communities off the electrical grid to reduce diesel use.

- Support the development of a wind, hydro, solar, wood or geothermal project in a diesel powered community.

Conduct pilot studies to assess the feasibility of renewable energy initiatives.

- New or expanded district heating systems.
- Solar powered irrigation system for a community farm.
- Wood fuelled heating systems for institutional buildings.

Promote renewable energy sources for heating and transportation.

- Provide financial incentives for renewable energy initiatives.
- Provide training and technical assistance to build local skills for renewable energy production.

Yukon's Renewable Energy

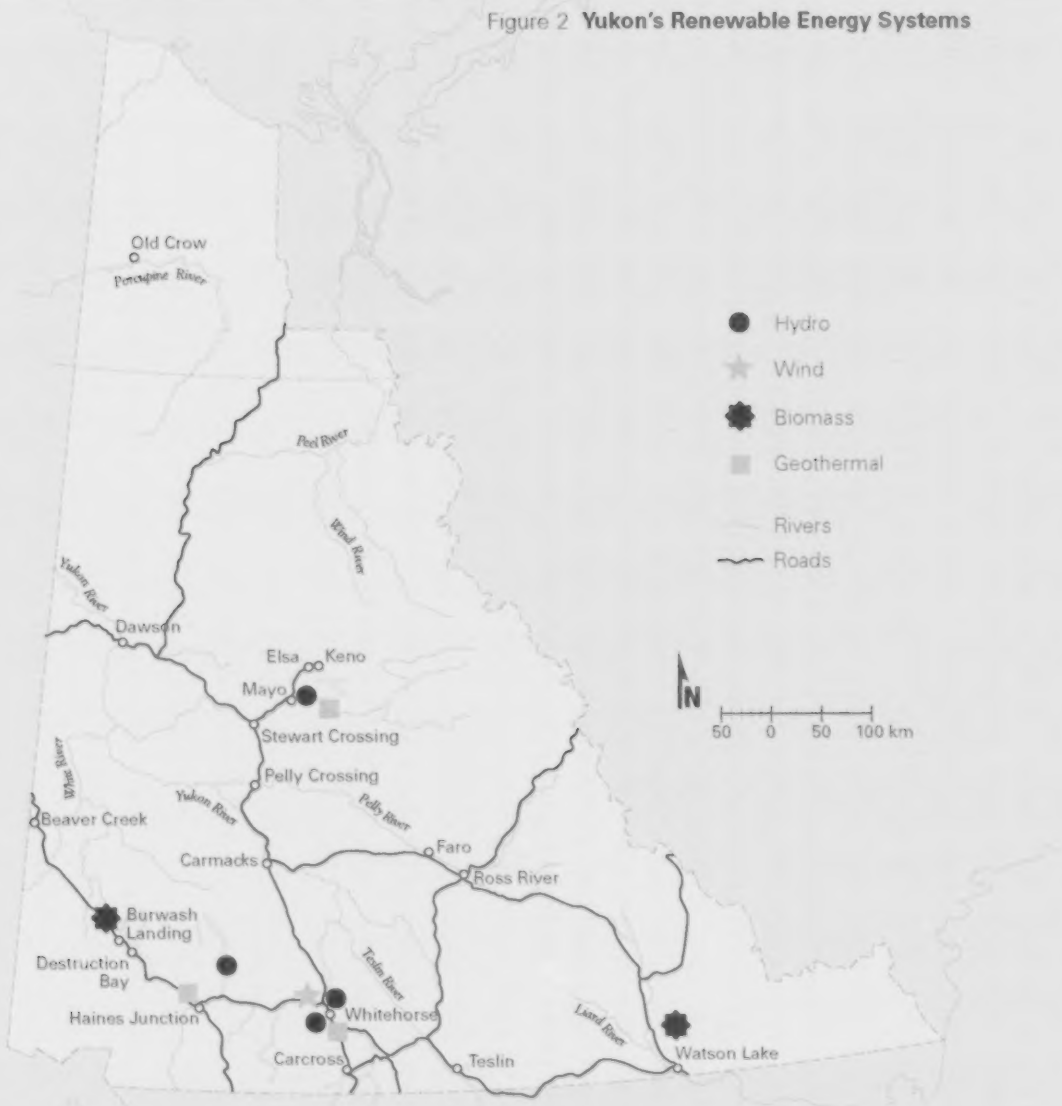
Most of Yukon's electricity comes from hydro, a renewable energy source. Many homeowners use wood for heating, which is another renewable source of energy. The current use of other renewable sources is fairly limited.

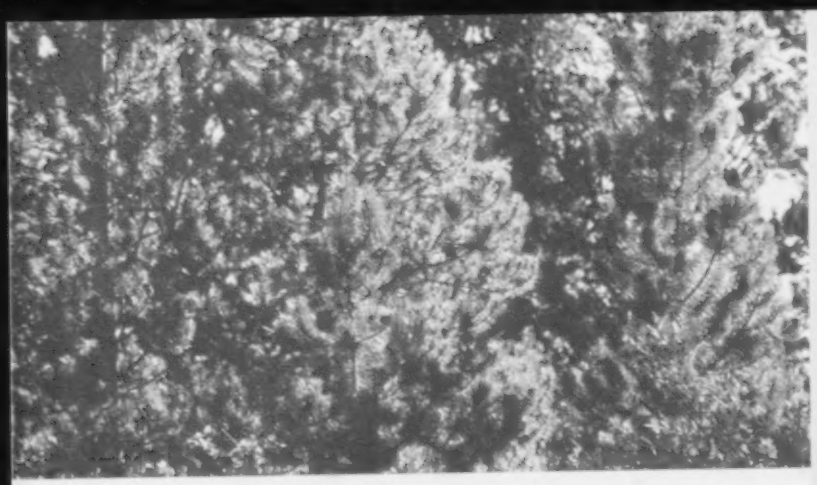
Figure 2 shows the location of existing renewable energy systems in Yukon. The map includes community scale systems. It does not show smaller systems such as rooftop solar panels or wood stoves, which can be found throughout the territory.

Yukon's primary renewable energy resources include hydro, wood, solar, wind and geothermal.

- Most of Yukon's electricity is generated from hydro. Hydroelectricity is a significant renewable energy resource for Yukon.
- Yukon's forest resources provide a source of wood (also known as biomass) for heating and power. At least 12,000 cubic metres of firewood is consumed annually.
- There is an abundance of solar energy in the territory at certain times of the year.
- Wind resources exist in many parts of Yukon. The Energy Solutions Center is mapping wind resources.
- Geothermal resources have been identified in many parts of Yukon. The City of Whitehorse recently mapped geothermal potential within city limits.

Figure 2 **Yukon's Renewable Energy Systems**





Renewable Energy Projects

While there is potential to use more renewable energy throughout Yukon, it will be especially important to develop projects in communities that rely on diesel for electricity. Those communities include Beaver Creek, Burwash Landing, Destruction Bay, Old Crow, Upper Liard and Watson Lake.

Diesel is an expensive electricity source and it creates a lot of greenhouse gas emissions. Replacing diesel with renewable energy brings significant economic and environmental benefits. Renewable energy projects for communities using diesel will be a high priority within this Strategy. Where it is not possible to replace diesel entirely, the potential for using the waste heat will be investigated.

More pilot projects are needed to confirm that some renewable energy initiatives are technically and economically feasible. The Yukon government will continue to partner with others on renewable energy pilot projects, including:

- An expanded district heating system in Watson Lake;
- A solar powered irrigation system for the Little Salmon Carmacks First Nation community farm; and
- Wood energy systems for institutional buildings such as Elijah Smith Elementary School.

Information from these renewable energy projects and others will be added to a map that could inform communities of their renewable energy potential. Maps of Yukon's renewable energy resources can be viewed at **www.emr.gov.yk.ca/energy/renewable_energy_map_viewer_jump.html**.

In addition to the specific renewable energy initiatives, the Yukon government will provide financial incentives, training and technical assistance for renewable energy. These actions will facilitate the development of new renewable energy sources and transform the renewable energy market.

Wood Energy

Yukon has forest resources that could be used to meet some of Yukon's energy needs for heating and electricity. Wood is a renewable energy source that could make Yukon more energy self-sufficient.

Wood energy can be produced in Yukon, creating local economic benefits for the energy sector and the forest industry. Governments, communities, First Nations and independent power producers can participate in wood energy projects.

Wood fuel can come from forests affected by fire and spruce beetle infestations, Fire Smart projects, scrap lumber, sawmill wastes, timber harvesting and tree clearing for land development or right-of-ways.

Wood is a carbon neutral energy source that can help us reduce greenhouse gas emissions that result from the use of fossil fuels. Modern technology for pellet stoves and wood boilers can minimize air emissions from wood burning.

There are a number of opportunities for making greater use of wood to meet energy needs in Yukon.

- Wood pellets are made from waste wood such as sawdust from the forest industry. Pellets are burned in pellet stoves, which are very efficient and clean burning. The Yukon government will encourage high efficiency stoves such as pellet stoves for home heating.
- Wood boilers are used in Yukon communities to heat institutional buildings and provide district heating for multiple buildings. The Yukon government will support a pilot project to test the feasibility of a new wood heating system for Yukon government buildings.

The initiatives under the Strategy will build a wood based bio-energy industry in Yukon. The strategy will build a local market for wood energy technologies and products.

Electricity

The Energy Strategy is focused on electricity investments for the future. The Yukon government recognizes that it will need to increase the supply of electricity, especially from renewable sources. The government also needs to manage demand to ensure Yukoners are making optimal use of the electricity resources in the territory.

It will be important to invest in additional electricity infrastructure to keep pace with growing electricity needs of individuals, businesses and communities. New industrial projects will require reliable and affordable energy in order to go forward. Investment in electricity infrastructure will leverage economic development for the territory. Given the cost of infrastructure investments, partnerships with the private sector and other governments will be considered.

Investments in additional renewable energy infrastructure will be required in order to enhance the kinds of long term legacy benefits that are currently enjoyed with the existing hydro system. These investments will also buffer Yukon's energy sector from volatile fossil fuel prices and help to minimize greenhouse gas emissions from diesel generated electricity.

There is a need to do more to manage electricity demand in the territory. The Yukon government is committed to enhancing demand management initiatives. See page 17 for more information on demand management.

Goal

Electricity supply will be increased and demand will be managed to meet current and future electricity needs.

Strategies

- Enhancing the supply of electricity and managing demand to ensure access to a secure, reliable and cost competitive source of electricity.
- Maximizing the use and efficiency of existing hydroelectric infrastructure.
- Increasing and diversifying Yukon's supply of electricity from renewable sources to decrease diesel use and minimize greenhouse gas and air emissions.
- Considering renewable energy and cleaner sources such as natural gas for all new electricity generation projects.
- Leveraging territorial, federal and private funds in infrastructure investments to meet growing electricity demand and promote economic development.
- Informing the public about the true costs of electricity and promoting incentives and initiatives to encourage energy efficiency and conservation.
- Managing electricity demand to reduce energy requirements at peak times.
- Working with Yukon Development Corporation, Yukon Energy Corporation and the Yukon Electrical Company Limited to develop an improved approach to managing electricity generation and distribution, with the objectives of improving reliability, providing downward pressure on rates, and expanding the system to meet the needs of a growing Yukon economy.

Increasing Yukon's Electricity Supply

Most of our electricity comes from hydro resources. Diesel is used for communities off the electrical grid. Diesel is also used where there is not enough hydroelectricity to meet the demand. A small amount of electricity, less than one percent, comes from wind.

There was a major drop in electricity demand in the late 1990s when the Faro mine closed. Since then, electricity use has been slowly and steadily increasing, as shown in **Figure 3**. This gradual increase is largely a result of residential and commercial development in Whitehorse and new institutional buildings such as the Canada Games Centre.

In the future, possible developments like new mines or pipelines could significantly increase demand for electricity. Yukon's hydroelectricity capacity could be reached in a few years and might have to rely on diesel to meet demand. It will be important to ensure there is sufficient capacity from renewable sources to avoid using diesel as much as possible, which is increasingly expensive and results in a lot of greenhouse gas emissions.

Increasing the amount of electricity from renewable sources is a high priority in the Energy Strategy. This should be done by enhancing existing infrastructure as well as developing new sources such as small hydro sites, wind turbines, wood powered systems and geothermal facilities. Some of these projects will be undertaken by utility companies. Other renewable energy projects could also be developed by independent power producers or individuals.

Another priority is to identify opportunities for expanding the electrical grid to other communities or to industrial projects such as new mines. A longer term concept is to consider connecting Yukon's isolated grid to other jurisdictions; a significant project that would require further research and analysis.

Priority Actions

Support strategic investments in infrastructure to increase the supply of electricity from renewable sources.

- Enhance existing hydroelectric infrastructure.
- Develop new sources of hydro, wood, wind or geothermal energy.

Assess the feasibility of expanding the Yukon transmission system to connect to other communities, industrial projects or jurisdictions.

- Connect the two Yukon electrical grids by completing the Carmacks to Stewart transmission line.

Update and develop a policy framework for electricity that emphasizes efficiency, conservation and renewable energy.

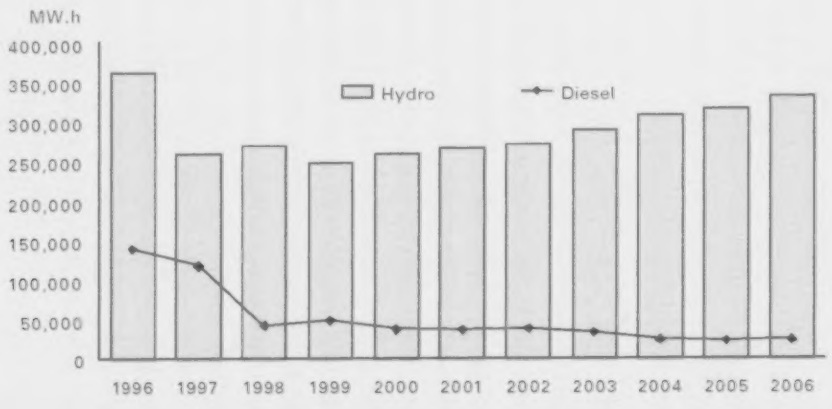
- Facilitate the purchase of electricity from independent power producers.
- Allow individuals to connect renewable energy sources to the grid.

Develop and implement demand management programs and incentives to promote energy efficiency and conservation.

Support research and development of technologies and policies that will optimize the use of hydroelectricity.

Consider appropriate roles, responsibilities, and corporate structure for Yukon Development Corporation and Yukon Energy Corporation to ensure effective management and operation, and optimize the efficiency and reliability of electricity generation and distribution.

Figure 3
Yukon Electricity Generation



Source: Yukon Bureau of Statistics, *Yukon Energy Facts 2007*

Yukon's Electricity Sector

Two utilities generate and distribute electricity in Yukon. The Yukon Energy Corporation (YEC) is the major producer of electricity. The Yukon Electrical Company Limited (YECL) is the major distributor of electricity.

YEC is a public utility under the Yukon Development Corporation that is owned by the Yukon government. YEC generates and transmits most of the electricity in the territory. The electricity comes from hydro, diesel and wind. YEC distributes electricity to a limited number of customers.

YECL is a private utility that is owned by ATCO Electric Limited. YECL generates a limited amount of electricity from diesel and hydro sources, mostly in communities that do not have access to the electrical grid. YECL distributes electricity to the majority of Yukon customers.

Figure 4 shows the electrical generation and transmission infrastructure, including the new transmission line from Carmacks to Pelly Crossing.

Figure 4 **Yukon's Electricity System**

YEC SYSTEM	(in MW)
Hydro Facilities	
Whitehorse (WAF)*	40.0
Aishihik	30.0
Mayo	5.4
Total	75.4
Wind Facilities	
Haeckel Hill	0.8
Diesel Facilities	
Whitehorse (WAF)	25.0
Faro (WAF)	5.4
Dawson	6.0
Mayo	2.0
Total	38.4
Total YEC System	114.6

YECL SYSTEM	(in MW)
Hydro Facilities	
Fish Lake	1.3
Diesel Facilities	
Carmacks (WAF)	1.6
Haines Junction (WAF)	1.8
Teslin (WAF)	1.5
Ross River (WAF)	1.0
Watson Lake	5.0
Beaver Creek	0.9
Destruction Bay	0.7
Old Crow	1.1
Pelly Crossing	1.0
Stewart Crossing	0.2
Swift River	0.2
Total	15.0
Total YECL System	16.3
Total Yukon Capacity	**130.9**

*WAF: Whitehorse-Aishihik-Faro interconnected grid

Source: Yukon Energy Corporation and the Yukon Electrical Company Limited.

Electricity Policies

The *Public Utilities Act* and Orders-in-Council that have been issued under this Act provide the legislative framework for producing and managing electricity resources. The electricity sector is primarily regulated by the Yukon Utilities Board.

In 2006, Yukon Energy Corporation submitted a 20-Year Resource Plan to the Yukon Utilities Board. The Plan focused on major electrical generation and transmission requirements from 2006 to 2025. Specific initiatives such as potential hydro sites and infrastructure upgrades are identified in the Resource Plan.

The priority policy actions for the Energy Strategy address gaps in the current electricity regulations, policies and plans.

The first policy action is to facilitate the purchase of electricity from independent power producers. This involves developing a new policy that would enable private companies to generate electricity and sell it to utility companies or electricity consumers. The intent of this policy action is to generate additional sources of electricity from cleaner or renewable sources.

The second policy action is to develop a net metering policy. Net metering is defined in the glossary in Appendix II. This new policy would allow individual homeowners and businesses that produce their own energy from renewable sources such as wind or solar to connect their renewable energy sources to the grid. These individuals could offset their electrical bills by selling their surplus renewable power. A key objective of this policy action is to encourage the development of new small scale sources of renewable energy.

While the first two policy actions address electricity supply needs, the third deals with electricity demand. The third policy action for electricity is a commitment to provide incentives for demand management.

Demand Management

Energy demand management is about action to reduce energy use. The actions could reduce overall energy consumption or target energy reductions during peak times.

Energy efficiency and conservation are important demand management tools. In the electricity sector, demand management also involves changing energy use patterns to reduce peak energy requirements.

Reducing or changing the demand for electricity can delay the need for costly infrastructure investments and decrease diesel use. Demand management improves the efficiency of the electricity sector.

Incentives for demand management could consider the following options.

- Energy efficiency improvements for major energy consumers such as government buildings.
- Electricity rates that encourage people to use less energy and shift their energy use away from peak times of the day.
- Opportunities for a greater number of customers to make use of surplus hydroelectricity when it is available.
- Create a program like Power Smart to reduce demand and assist in achieving the energy efficiency target for Yukon.

Any new incentives for managing demand would build on existing Yukon government initiatives. Currently, the following programs support demand management for electricity.

- Energy Solutions Centre programs for appliance rebates, tracking energy use for public buildings and various energy efficiency initiatives.
- Yukon Housing Corporation programs for home energy evaluations, energy efficiency retrofits and GreenHome incentives for new and existing homes.

Oil and Gas

The Yukon government recognizes that oil and gas will continue to be a significant component of Yukon's energy mix and energy resources for the foreseeable future. The government's strategy for oil and gas is focused on how to best develop Yukon's resources and also meet Yukon's energy needs.

Yukon's oil and gas sector could be a major contributor to Yukon's economy in terms of jobs, business opportunities and revenues to government. Declining fossil fuel production from technically and economically feasible sources, rising oil and gas prices and the anticipated northern pipelines are creating attractive conditions for an oil and gas industry. The Yukon government is committed to ensuring the oil and gas sector will deliver optimal benefits to Yukon.

The government will encourage the use of Yukon's resources to replace imported products. This is part of government's overall efforts to rely on local energy sources where possible to ensure a stable and secure supply of energy for Yukon.

It is essential that Yukoners continue to use oil and gas resources efficiently and replace them with cleaner or renewable energy sources whenever it is practical to do so. Environmentally responsible oil and gas development practices are necessary to conserve Yukon's natural environment. Best management practices are a key part of Yukon's oil and gas regime.

Goal

Oil and gas resources will be developed responsibly for local use within Yukon and export.

Strategies

- Developing an oil and gas sector in a way that will deliver the greatest benefits to Yukon.
- Promoting efficiency and conservation for the use of oil and gas resources.
- Reducing Yukon's reliance on imported fossil fuels.
- Protecting environmentally and culturally significant areas through the Yukon oil and gas rights disposition process.
- Facilitating onshore and offshore oil and gas exploration and development to optimize benefits for Yukon people.
- Improving information about oil and gas resources to encourage investment and facilitate responsible resource management.
- Working with First Nations on a common onshore oil and gas regime.
- Partnering with other governments, industry and Inuvialuit on planning for offshore oil and gas development.
- Enhancing human resource capacity for the oil and gas sector through education, training and employment opportunities.

Using Oil and Gas in Yukon

An estimated 76% of the energy consumed in Yukon is from refined petroleum products. Nearly half of this demand is for diesel fuel. Most of the other demand is for gasoline, stove oil, kerosene and aviation fuel. An additional 7% of the energy used comes from natural gas liquids such as propane.

Clearly, there is an opportunity to reduce consumption of petroleum products such as diesel fuel. The oil and gas strategies and actions will work with the Energy Strategy initiatives to promote efficiency, conservation and renewable energy. Even while Yukon is developing an oil and gas sector, the government will maintain efforts to reduce consumption of oil and gas resources in the territory.

All of the fossil fuels used in Yukon are imported from other jurisdictions. Although the territory has reserves of oil and gas, our needs for this energy source are met entirely through imports.

The top oil and gas priority for the Yukon government is to ensure exploration and development results in local benefits for Yukon. That is why the Energy Strategy will make it a priority to promote and support opportunities for replacing imported fuels with resources that are made in Yukon.

Using Yukon's oil and gas resources within the territory could reduce the amount of energy that is consumed in order to transport imported fuels from outside the territory. These transportation savings would result in lower energy costs and fewer greenhouse gas emissions.

The priority action to develop Yukon oil and gas resources for local use could enable replacement of diesel with cleaner fuels such as natural gas. One way to achieve this would be to support private sector initiatives to generate heat and power from Yukon's natural gas. Communities or large industrial projects such as mines that would otherwise depend on diesel could use energy from natural gas instead.

Priority Actions

Support strategic opportunities to replace imported diesel fuel with Yukon's oil and gas resources, for example:

- Small-scale oil refinery or liquefied natural gas processing plant; and
- Access to natural gas energy from the proposed Alaska Highway Pipeline or a smaller pipeline in Yukon.

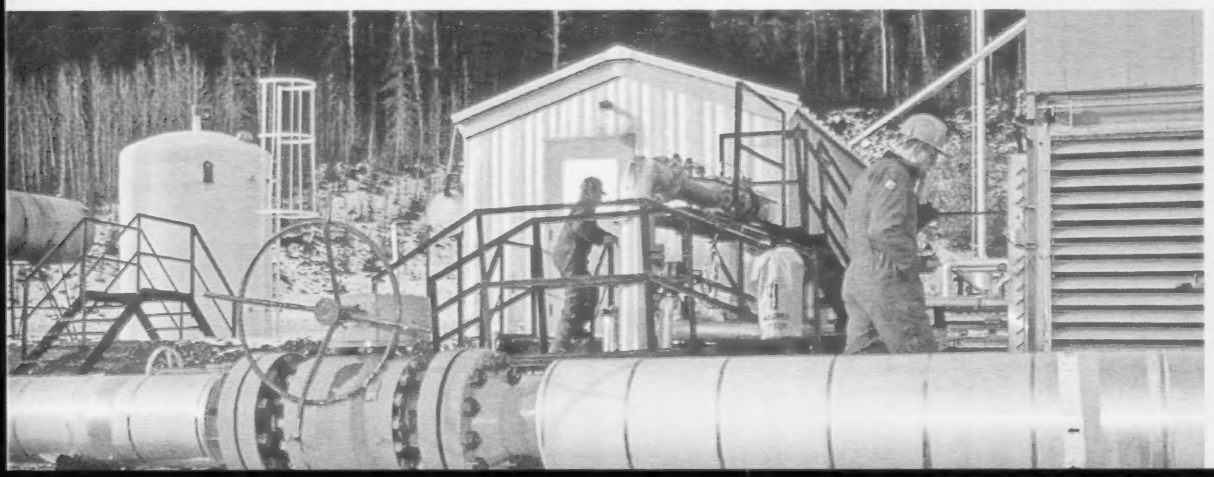
Develop a competitive and comprehensive oil and gas regulatory regime which will emphasize performance-based compliance.

- Establish new pipeline regulations under the *Oil and Gas Act*.
- Update best practices for environmentally responsible oil and gas exploration and development.
- Develop best practices for minimizing greenhouse gas emissions in the oil and gas sector.

Prepare for northern pipeline development such as the Alaska Highway Pipeline.

Promote private sector investment in the development of Yukon's oil and gas resources.

Finalize and implement an agreement with the federal government for sharing management and revenues for offshore oil and gas.



Yukon's Oil and Gas

Yukon's onshore and offshore oil and gas resources are shown in **Figure 5**. The shaded areas on the map identify known and potential resources.

Exploration of oil and gas resources is continuing. Most of the exploration activities are concentrated in the Eagle Plain region and the Peel Plateau.

Oil and gas production within the territory is currently limited to three natural gas wells at the Kotaneelee field, which is located in the Liard Basin.

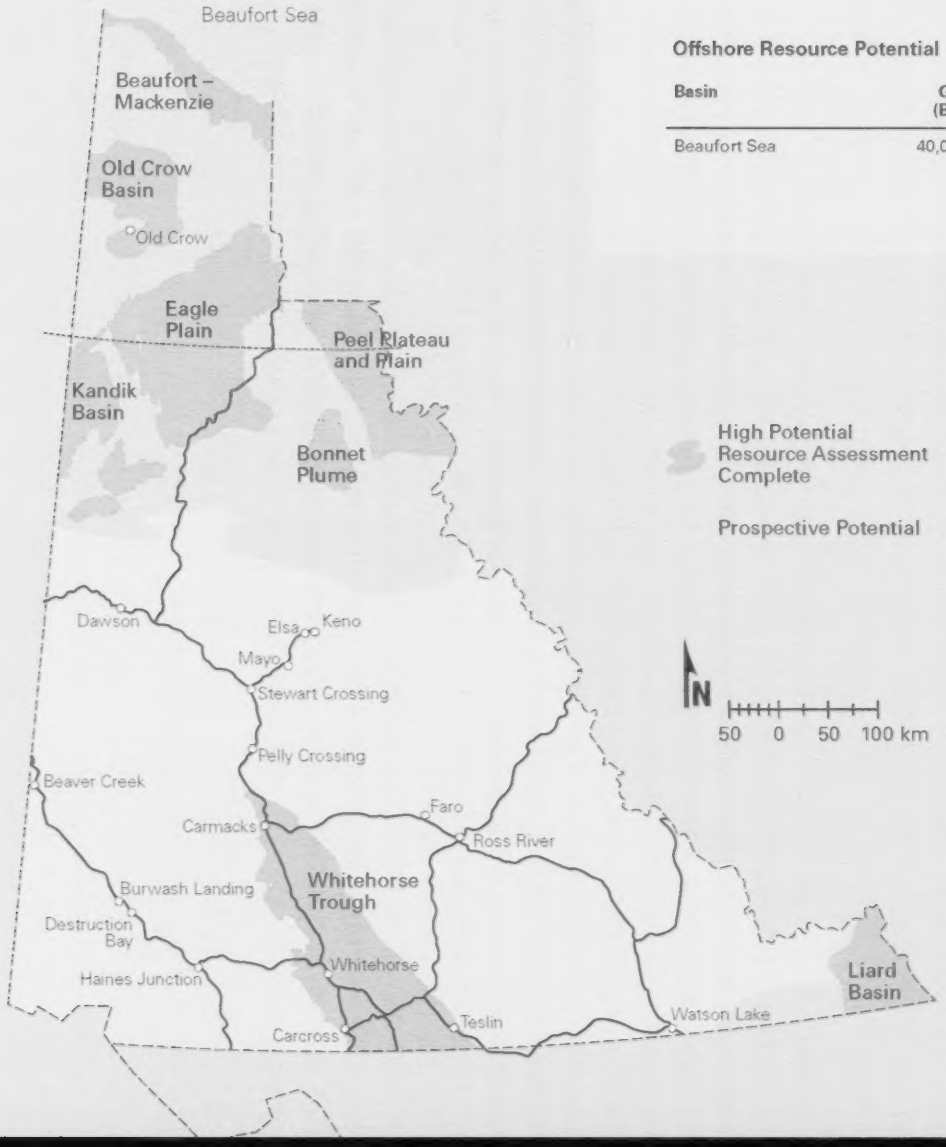
Onshore Resource Potential

Basin	Gas (Bcf)	Oil (MMbbls)
Beaufort-Mackenzie	1008.1	216.7
Old Crow	1149.7	0
Kandik	648.9	99.3
Eagle Plain	6055.3	436.7
Bonnet Plume	800.4	0
Peel Plateau and Plain	2915.8	0
Liard	4109.9	0.1
Whitehorse Trough	423.4	19.2
Total	**17,111.5**	**772.0**

Offshore Resource Potential

Basin	Gas (Bcf)	Oil (MMbbls)
Beaufort Sea	40,000	4,500

Figure 5 **Yukon's Oil and Gas Resources**



Developing an Oil and Gas Sector in Yukon

The exploration and development of onshore oil and gas resources is regulated by the *Oil and Gas Act* and regulations for Drilling and Production, Geoscience Exploration, License Administration, Disposition and Royalties. Offshore oil and gas is managed under federal legislation.

The Yukon government issues oil and gas rights through a competitive bidding process. Rights are granted through permits and leases. New oil and gas projects are subject to applicable licenses, land use permits and environmental assessments.

The Yukon government is engaged in efforts to facilitate the development of oil and gas resources. The foundation for government action is the development and administration of a regulatory regime for oil and gas activities.

A priority action for the Energy Strategy reflects the government's ongoing efforts to prepare for pipeline projects such as the Alaska Highway Pipeline. Pipeline preparations involve negotiating benefit agreements and developing employment, training and business opportunities for Yukon people.

Another priority action is to promote exploration and development of Yukon's oil and gas resources. This emphasizes the promotion of private sector investment in oil and gas exploration and infrastructure development.

The oil and gas priorities in the Strategy are mostly concerned with onshore resources. However, there is potential to develop significant offshore oil and gas resources as well. The Yukon government is working with the federal government to finalize an agreement for managing offshore resources and revenue sharing from their development.

Best Practices

The Yukon government has been developing best management practices for the oil and gas sector. Best practices can reduce the time, intensity or duration of the footprint on the environment.

The Yukon government has already developed best practices for seismic exploration, historic resources and wilderness tourism. For more information, go to **www.emr.gov.yk.ca/oilandgas**.

There are two priority actions in this Energy Strategy for advancing the work on best management practices for oil and gas.

- Update best practices for environmentally responsible oil and gas exploration and development.
- Develop best practices for minimizing greenhouse gas emissions in the oil and gas sector.

The Yukon government will continue to work with industry, other governments and stakeholders on the development of the best management practices.

Energy Choices

Yukon is poised to make some important choices about energy. How Yukoners choose to develop and use energy resources will have a profound impact on the environment, the economy and Yukon communities. The Energy Strategy will help make the best energy choices for today and tomorrow.

The energy priorities in this Strategy consist of efficiency and conservation, renewable energy, electricity and oil and gas. The Yukon government acknowledges that the conditions that shape energy priorities are constantly changing. As a result the government will need to re-examine these energy priorities from time to time. This will require that the government evaluate all potential energy sources, including those not in the current energy mix.

These energy choices extend beyond choosing energy sources. The Yukon government's choices will range from setting policy direction to developing programs. The government will need to make choices about how to demonstrate leadership and build partnerships. The government will work to ensure these choices will reflect the direction that is provided by this Energy Strategy. The overall objective is that Yukon's choices about short term priorities move towards the long term vision.

Goal

The *Energy Strategy for Yukon* will set long term direction and define short term priorities for the Yukon government.

Strategies

- Evaluating potential energy sources to make choices that will provide the greatest benefits for the least costs.
- Setting policy direction for energy development, conservation and use.
- Incorporating the Strategy's principles in decision making.
- Building partnerships to develop and manage Yukon's energy resources.
- Allocating sufficient resources to implement the Strategy.
- Coordinating implementation with the Climate Change Action Plan wherever possible.
- Reviewing the Strategy to ensure it remains relevant and current.
- Demonstrating progress on the priority actions.

Yukon's Energy Options

Yukon's energy priorities may shift as energy options become more or less economically viable, technically feasible, socially acceptable and environmentally responsible. The government will need to revisit the options to confirm priorities for developing and using Yukon's energy resources.

Figure 6 provides a framework for Yukon's energy options and the Energy Strategy priorities. The energy options are listed below in alphabetical order. The key opportunities and challenges for the energy options are identified. These economic, environmental, social and technical factors are important for determining Yukon's energy priorities.

Some examples of the opportunities and challenges associated with Yukon's energy options are provided in Appendix III.

One of the priority actions for this Strategy is to carry out a detailed and forward looking assessment of Yukon's energy options. The assessment would consider the economic, environmental and social implications of Yukon's energy choices and would examine the costs and benefits.

This assessment of energy options will be used to develop a policy framework for coal bed methane, coal and nuclear power. While these are not current priorities for the Yukon government, there are questions about their future role in Yukon's energy sector. The detailed government policy on these options would need to be developed through public discussion of potential risks before permitting any development of these energy sources.

Figure 6 **Yukon's Energy Options and Priorities**

Priority Actions

Assess new and existing energy sources that could be developed in Yukon.

- Consider the economic, environmental and social implications of these sources.
- Compare the costs and benefits of the energy choices.

Hold public consultation on a policy framework for coal bed methane, coal and nuclear power before permitting any development.

Monitor implementation of the Energy Strategy and report regularly on progress. The first progress report will be released by the end of 2010.

Implementing the Strategy

The Yukon government is committed to implementing this Energy Strategy. Implementation will mean incorporating the vision and principles in everyday decisions about energy. It will also mean following the strategies to ensure a strategic approach to energy issues.

The next step for the Yukon government is to begin working on the priority actions. These actions represent the government's short term priorities for developing and using energy resources in Yukon. The priority action for delivering on the Strategy's commitments is to monitor implementation and report on progress by the end of 2010.

Climate Change Coordination

The Energy Strategy has been developed in coordination with the Climate Change Strategy and Action Plan. These energy and climate change initiatives will work together to address the reduction of greenhouse gas emissions.

Energy Strategy for Yukon and the Climate Change Strategy and Action Plan are part of the Yukon government's response to climate change.

The Department of Environment is the lead for government's Climate Change Strategy and Action Plan. Implementation of the Energy Strategy will continue to be coordinated with the Yukon government's climate change initiatives.

Roles and Responsibilities

Energy, Mines and Resources is responsible for coordinating implementation of the Energy Strategy and delivering on many of the priority actions. The Energy Solutions Centre will lead many of the energy efficiency, conservation, renewable energy and electricity initiatives. The department's Oil and Gas Division will lead the oil and gas initiatives. The department's Sustainable Resources Division will support wood energy and local food production.

Other Yukon government departments and corporations will have a role in this Energy Strategy. Highways and Public Works will implement efficiency and conservation priorities for government operations. Education will deliver an energy stewardship initiative in the schools. Yukon Housing Corporation will have a key role in efficiency for residential housing. Yukon Development and Yukon Energy Corporations will be involved in many of the electricity initiatives.

Partnerships

Governments, organizations and individuals are all engaged in developing, managing and using energy resources. The Yukon government recognizes the need to work in partnership with others on energy issues, including:

- federal, First Nations and municipal governments;
- industries, businesses, non-profit organizations and academic institutions; and
- Yukon people.

The Yukon government is looking forward to working with other governments, organizations, businesses, industries and Yukon people on implementing this Strategy.

Conclusion

Energy Strategy for Yukon looks ahead to the future and envisions a sustainable energy sector that is environmentally, economically and socially responsible.

This Energy Strategy considers how Yukon can develop and use energy resources to meet the territory's energy needs and generate benefits for Yukon people.

In framing the key energy issues for the Strategy, the government has concluded that its initial efforts should concentrate on energy efficiency and conservation, renewable energy, electricity and oil and gas.

While the Yukon government is leading the development and implementation of the Strategy, it recognizes that other governments and organizations have an important role to play. All Yukon people have a stake in the outcome.

Appendix I: Public Consultation

The Yukon government demonstrated a commitment to working with Yukon people on the *Energy Strategy for Yukon*. This commitment was reflected in development process, which provided opportunities for public participation at key stages in the development of the Strategy.

Government officials initially met with interested organizations and stakeholders during the summer of 2007 through a series of informal discussions on the approach for developing the Strategy and the issues to be addressed.

A group of representatives from governments, the private sector and non-profit organizations attended a technical workshop in November 2007 to discuss principles and priorities for the Energy Strategy.

The draft Energy Strategy was released for consultation during May and June 2008. More than 75 people provided feedback on the draft Strategy, including 30 written submissions. The government heard from individuals, businesses, industries, non-profit organizations, First Nations and municipalities.

The Yukon government carefully considered all of the feedback on the draft and attempted to address as many of the comments as possible in this Energy Strategy.

The Yukon government thanks those people, organizations and governments who have participated in the development of this *Energy Strategy for Yukon*.

Information on the consultation process and key references for the Energy Strategy are available at: www.emr.gov.yk.ca/energy

Appendix II: Glossary

Agricultural Sector: Establishments primarily engaged in agricultural, hunting and trapping activities.

BCF (billion cubic feet): Unit of measure for volume of natural gas.

Biomass: Energy resources from organic matter, including wood, agricultural waste and other living material that can be burned to produce electricity and heat.

Commercial and institutional sector: Energy consumed by activities related to trade, finance, real estate, public administration, education and commercial services (including tourism).

Demand management: Initiatives that influence patterns of energy consumption, including actions to shift energy use from peak times to periods when less energy is required.

Electrical grid: A network of power lines used to deliver electricity.

Geothermal: The use of heat from the earth to generate electricity or provide space heating and cooling.

Independent power producer: An energy producer who generates electricity for sale to utilities or consumers such as the general public, businesses or industries.

Industrial sector: Energy consumed by industries including mining, oil and gas, manufacturing and construction.

Megawatt hours (MWh): A measure of the energy produced by a generating station over time.

Million cubic feet (MMcf): Unit of measure for volume of natural gas.

Net metering: Electricity consumers who own small, renewable energy generators such as wind or solar can receive a credit for a portion of the electricity they generate.

Performance-based regulations: Set objectives for compliance and focus on whether or not the objectives are achieved, rather than prescribing how to achieve them.

Petroleum products: Products obtained from the processing of crude oil, natural gas liquids and other hydrocarbon compounds, including gasoline, fuel oil, kerosene, liquefied petroleum gas and other products.

Public administration sector: Energy consumed by federal, provincial and municipal government public administration activities.

Residential sector: Includes all personal residences including single family residences, apartments, apartment hotels, condominiums and farm homes.

Terajoules (TJ): Equal to one million million joules. A standard unit of measure that enables comparison between energy sources.

Transportation sector: Includes railways, airlines, marine, pipelines, road transportation, urban transit and retail pump sales.

Appendix III: Yukon's Energy Options

Some of the opportunities and challenges associated with Yukon's energy options are highlighted in the following table. The energy sources are listed in alphabetical order.

SOURCE	OPPORTUNITIES	CHALLENGES
Biomass (wood)	• Renewable resource that is locally available • Carbon neutral	• Produces some air emissions • Need to build industry in Yukon
Coal	• Coal is abundant, can supply lots of energy • Low cost and reliable fuel source	• Non-renewable energy with high emissions • Not currently used in Yukon
Efficiency and conservation	• Energy cost savings, lower emissions • Provides a new source of energy	• Need investments in efficiency • Causing a shift towards conservation
Geothermal	• Renewable and reliable with low emissions • Warm water resources exist in Yukon	• Not a conventional technology • Hot water resources needed for electricity
Hydrogen and fuel cells	• Renewable and reliable with no emissions • Can be used on grid or in remote areas	• High costs, limited technical experience • Need to develop infrastructure
Large hydroelectric	• Can supply lots of energy, no emissions • Reliable, renewable and locally available • Low cost to produce energy after start-up	• High capital costs, lengthy project approval • Upstream/downstream ecological effects • Public acceptability concerns
Natural gas	• Cleaner burning than other fossil fuels • Resource could be locally available	• Energy intensive extraction and transport • Produces greenhouse gas emissions
Nuclear	• No greenhouse gas emissions • Small reactors for remote areas	• High capital costs, no experience in Yukon • Health and safety risks, public acceptability
Petroleum products	• Reliable energy source • Low capital cost	• Non-renewable energy with high emissions • High operating and maintenance costs
Run-of-river hydro	• Small environmental impact, no emissions • Can implement incrementally	• Require adequate water flow • Supplies small amounts of energy
Solar	• Renewable energy source • No emissions	• High costs • Limited sunlight during winter
Wind	• Low production cost, works well with grid • Renewable, local energy with no emissions	• Moderate capital costs • Limited success in the north

Information on renewable energy sources, energy efficiency and conservation is available at:
www.emr.gov.yk.ca/energy